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(71) Applicant: SHARP KABUSHIKI KAISHA
22-22 Nagaike-cho Abeno-ku
Osaka 545(JP)

(72) Inventor: Kamada, Hiroshi
7-818 2-2, Nogaito-cho
Yamatokoriyama-shi Nara-ken(JP)

(72) Inventor: Kita, Sumio
488 Kodono-cho
Nara-shi Nara-ken(JP)

(74) Representative: Wright, Peter David John et al,
R.G.C. Jenkins & Co. 12-15, Fetter Lane
London EC4A 1PL(GB)

(54) Information input apparatus.

(57) A sheet information input apparatus for an electronic file system comprises an sheet input device for inputting a sheet image into the apparatus, a sheet judging device responsive to the input device for judging a type of specific code on the inputted sheet, and an information reading device responsive to the judging device for reading information from the sheet.

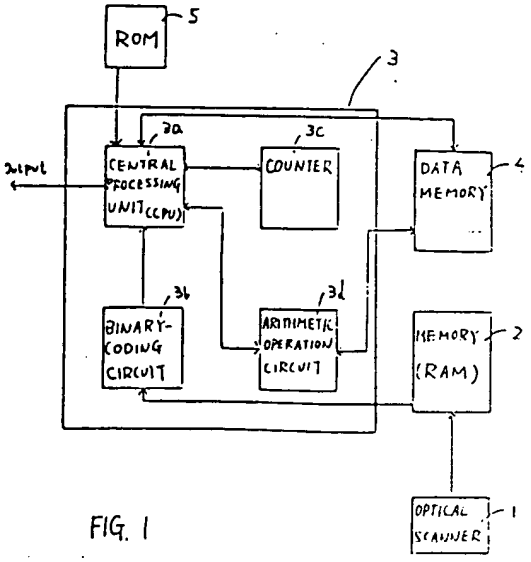

FIG. 1

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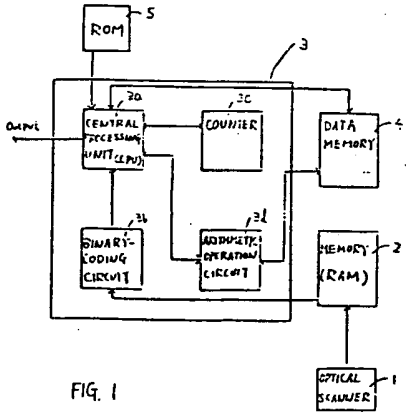

FIG. 1

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INFORMATION INPUT APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to an information input apparatus, and more particulary, an improved information input apparatus for an electronic file system including a sheet kind judging device which judges a specific code on a sheet inputted for reading and inputting information on the sheet.

In a conventional document information input apparatus, an image such as characters or figures on a document sheet is scanned by an optical scanner, and quantized image produced by scanning is inputted into and read by a central processing unit of a computer or the like.

The above document information input apparatus is suitable for inputting the image on the document sheet. However, a key word or a title relating to the inputted information has to be inputted by a manual operation on each document sheet or each predetermined amounts of the document sheets for retrieving the inputted images, so that the document information input time needs a long time when the image of each of a number of document sheets are to be inputted. Also, an input device which inputs the specific information such as the title or the key word must be additionally required for retrieving the images of the document sheets stored.

SUMMARY OF THE INVENTION

In one aspect of the present invention there is provided a sheet kind judging device for judging a kind of specific code such as a mark or a character on the sheet.

In another aspect of the present invention there is provided a sheet information input apparatus including a sheet kind judging device for judging a kind of specific code such as a mark or a character on the sheet.

In a still further aspect of the present invention there is provided an improved specific code detecting device for judging a type of specific code on a sheet for inputting or reading specific sheet information.

In a further aspect of the present invention there is provided a sheet information input apparatus for an electronic file system including a sheet kind judging device for judging whether an OMR (Optical Mark Reader) sheet, an OCR (Optical Character Reader) sheet, or a document sheet containing some image or information is inputted.

In a further aspect of the present invention there is provided a sheet information input apparatus for inputting specific information by judging a type of specific code on a sheet.

In a still further aspect of the present invention there is provided a sheet information input apparatus for inputting several information relating to each type of several specific code by judging each type of several specific code on a sheet.

Other aspects and further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. It should be understood, however, that the detailed description of and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

According to an embodiment of the present invention, a sheet information input apparatus comprises inputting means for inputting a sheet image into the apparatus, judging means responsive to the input means for judging a type of specific code on the inputted sheet, and reading means responsive to the judging means for reading sheet information.

The sheet may be selected to be one or more among an optical mark sheet, an optical character sheet, or a document sheet each containing some image or information.

The sheet information input apparatus, further, comprises sheet supply means for automatically supplying each of the sheets to the inputting means.

According to another embodiment of the present invention, a circuit for detecting a type of sheet comprises inputting means for inputting a sheet image, judging means comprising coding means for coding information on the sheet, calculation means responsive to the coding means for calculating a type of coded information, and detecting means responsive to the calculation means for detecting the type of sheet.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be better understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention and wherein:

FIG. 1 shows a block diagram of a sheet kind judging device according to an embodiment of the present invention;

FIG. 2 shows a plan view of the OMR sheet;

FIG. 3 shows a partially enalrged view of the OMR sheet of FIG. 2; and

FIG. 4 shows a flow chart of explaining the operation for judging the sheet-kind.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows a block diagram of a sheet information input apparatus including a sheet kind judging device according to an embodiment of the present invention.

The sheet as used herein indicates an OMR sheet, an OCR sheet and a document sheet each containing some image or imformation such as some pattern, For description sake, mainly the document sheet and the OMR sheet are examplified hereinbelow. Character information recorded on the OCR sheet can be read out by discrimining dark character portions from the white sheet background portion in view of light reflection difference by the reader.

A sheet information input apparatus according to an embodiment of the present invention comprises sheet kind judging means for judging whether either of a document sheet, an OMR sheet, and an OCR sheet is inputted, document input

means for inputting image of the document sheet, an optical mark reader for inputting specific information such as a key word or a title by reading specific marks on the OMR sheet, and an optical character reader for inputting imformation such as the key word or the title by reading characters on the OCR sheet.

With reference to FIG. 1, an optical scanner 1 comprising a CCD camera scans one page (or a piece) of the sheet transfered. The optical scanner 1 shows a reading resolution of about 12 lines/mm, for example. Information such as an image obtained by scanning the one page (or the piece) of the sheet is converted to electric signals and is stored into a memory 2. In the emodiment of the present invention, the information on the sheet is converted to electric signals with 12(row) x 12(column) picture elements/mm^2. For example, if the sheet is an A4 size sheet (297mm x 210mm), 8,981,280 picture elements (297 mm x 12 picture elements x 210 mm x 12 picture elements) are stored in the memory 2.

In response to the memory contents (the information of the one page (or the piece) of the sheet) of the memory 2, a controller 3 is operated to detect whether the sheet is either of the OMR sheet, the OCR sheet and the document sheet, and the controller 3 outputs the sheet information in accordance with the sheet-kind.

The controller 3 comprises a central processing unit (CPU) 3a, a binary-coding circuit 3b, a counter 3c and an arithmatic operation circuit 3d. Further, the controller 3 is connected with a data memory 4 such as a random access memory (RAM). The central processing unit (CPU) 3a is connected with a read only memory (ROM) 5. Microprocessor "Z-8000" supplied by SHARP CORPORATION, Japan provides the elements of FIG. 1 except the optical scanner 1.

The binary-coding circuit 3b is responsive to the contents of the memory 2 for detecting whether the level of the video signal (the electric signal) is smaller or greater than that of a constant threshold value, and the video signals (the electric signals) are converted to black codes "1" and white codes "0". If the sheet is the A4 size sheet, 8,981,280 picture elements are converted to black codes "1" and white codes "0".

The CPU 3a is operated to detect whether each of the picture elements is the black code "1" or the white code "0" by searching on the sheet in response to the output of the binary-coding circuit 3b.

The counter 3c is operated to measure a distance from one end of the sheet to a point for changing the black code "1" to the white code "0", or to a point for changing the white code "0" to the black code "1" by counting in response to the judging of the CPU 3a.

The data memory 4 stores each of the measurement results of the counter 3c, or the calculation results of the arithmatic operation circuit 3d, or the like.

The arithmatic operation unit 3d calculates values relating to the specific codes on the OMR sheet, the OCR sheet and the document sheet in response to the contents of the memory 2.

The ROM 5 stores values relating to the size and position of a timing mark M as the specific code of the OMR sheet, or the size or position of a writing zone for writing characters or numericals on the OCR sheet, or the like.

The CPU 3a outputs the sheet kind judging signal by comparing the calculation results of the arithmatic operation unit 3d or the contents of the memory 4, and the stored values of the ROM 5.

The operation for judging whether the sheet is the document or the OMR sheet will be described as follows.

FIG. 2 shows a plan view of the OMR sheet. FIG. 3 shows a partially enalrged view of the OMR sheet of FIG. 2. FIG. 4 shows a flow chart of explaining the operation for judging the sheet-kind.

Timing marks M on the OMR sheet show read zones in the X (row) direction and in the Y (column) direction. The timing marks M are black, and the timing mark M is formed by a pattern by black code "1".

The document sheet does not have the timing marks M showing the read zone, so that the sheet transfered is detected as the document sheet or the OMR sheet by judging whether fixed size timing marks (black marks) form a specific pattern. Accordingly, the kind of the sheet can be judged.

Step S1: Information (image) on the one page (or the piece) of the sheet is stored into the memory 2 by the optical scanner 1.

Step S2: The search of the timing mark M starts in the Y direction from the point a0 which has a distance X1 along the X direction far from the end Ⓐ (origin) of the sheet. The distance X1 is previously stored in the ROM 5.

Step S3: Step S3 is operated to detect whether the black code "1" of the timing mark M is present or absent on the sheet in response to the output of the binary-coding circuit 3d.

Step S4: If the black code "1" of the timing mark M is present on the sheet, a distance a1 is stored into the data memory 4. The distance a1 is a distance from one end of the sheet to a point for changing the white code "0" to the black code "1" and is counted by the counter 3c. Further, the search of the timing mark M is executed in the Y direction.

Step S5: Step S5 is executed to detect whether the white code "0" is present or absent.

Step S6: If the white code "0" is present on the sheet, a distance a2 is stored into the data memory 4. The distance a2 is a distance one end of the sheet to a point for changing the black code "1" to the white code "0" and is counted by the counter 3c.

Step S7: The width a21 (=a2 minus a1) of the first timing mark M is calculated by the arithmetic operation unit 3d, and the width a21 is stored into the data memory 4.

Step S8: The CPU 3a is operated to detect whether the width a21 of the first timing mark M is present within a range from a predetermined width $A - \Delta A$ to another pridetermined width $A + \Delta A$. For example, $A - \Delta A \leqq a21 \leqq A + \Delta A$ where $a21 = a2 - a1$. The predetermined width A of the timing mark M and error $\pm A$ are previously stored into the ROM (Read Only Memory) 5 as shown in FIG. 1.

Step S9: If the width a21 of the first timing mark M is absent between the widths $A \pm \Delta A$, the sheet is judged as the document sheet. If the width a21 of the first timing mark M is present between the widths $A \pm \Delta A$, the next step is executed.

Each of steps S10 - S16 corresponds to each of the steps S3 - S9. The steps S10 - S16 are operated to detect whether a second timing mark M is present or absent on the sheet. If the second timing mark M is present, a distance a3 from one end of the sheet to a point for changing the black code "1" to the white code "0" is measured by the counter 3c, and a distance a4 from one end the sheet to a point for changing the white code "0" to the black code "1" is measured by the counter 3c. In the Step S15, when the width a43 (=a4 minus a3) of the second black mark M is present between the widths $A \pm \Delta A$, step 17 is executed.

Step S17: Step S17 is operated to detect whether an interval L between the center of the width a21 of the first timing mark M and the center of the width a43 of the second timing mark M is present within a range from a predetermined interval $B - \Delta B$ to another predetermined interval $B + \Delta B$. The predetermined interval B between centers of two timing marks and errors $\pm \Delta B$ are previously stored into the ROM 5 as shown in FIG. 1. For example, $B - \Delta B \leqq L \leqq B + \Delta B$ where $L=(a43/2 + a3) - (a21 + a1)$

Step S18: When the interval L is absent between the intervals $B \pm \Delta B$, the sheet is judged as the document sheet. If the interval L is present between the intervals $B \pm \Delta B$, the next third timing mark M is searched by using the steps S10-S16. In the step S15 for the third timing mark M, when the width of the third timing mark M is present between the widths $A \pm \Delta A$, the steps S17 and S18 for the third timing mark M are executed. In the steps S17 and S18 for the third timing mark M, the interval

between the center of the width of the second timing mark M and the center of the width of the third timing mark M is compared with the intervals $B \pm \Delta B$.

Although the search of the timing mark M is stopped when the sheet is judged as the document sheet, when the search of the timing mark M reaches the upper end of the sheet in the Y direction, the search of the timing mark M is executed in the X direction by the same operation. The values A, $\pm\Delta A$, B, $\pm\Delta B$ can be changed dependent on the size of the timing mark M in the X direction.

In the search of the timing mark M in the X direction, the search of the timing mark M is stopped when the sheet is judged as the document sheet or the search of the timing mark M reaches the upper end of the sheet in the X direction. When the search of the timing mark M reaches the end of the sheet in the X direction, step S19 is executed.

Step S19: After the search of the timing mark M is executed in the X and Y directions, the sheet is judged as the OMR sheet.

The values $\pm\Delta A$ and $\pm\Delta B$ can be selected dependent on printing accuracy of the OMR sheet or the OCR sheet and reading accuracy of the optical scanner 1.

When the sheet is judged to be the OMR sheet and the OMR sheet detecting signal is outputted from the CPU 3a, the mark position on the OMR sheet is optically read (for example, N) and the mark imformation is outputted and stored into a predetermined memory according to the ordinal skill in the art.

If the sheet is judged to be the document sheet and the document sheet detecting signal is outputted from the CPU 3a, the image on the document sheet is read and inputted according to the ordinal skill in the art.

In the present invention, the OCR (Optical Character Reader) sheet can be used in place of the OMR sheet. Also, each type of the OCR sheet, the OMR sheet, and the document can be discriminated.

If both the document sheet and the OCR sheet are used in the sheet information input apparatus, the document sheet or the OCR sheet can be detected by judging the specific code relating to writing zone on the OCR sheet for writing characters or numerals to be optically read. Accordingly, when the sheet is judged to be the OCR sheet and the OCR sheet detecting signal is outputted from the CPU 3a, the characters or numerls on the OCR sheet are optically read and inputted into the predetermined memory according to the ordinal skill in the art.

According to the present invention, if a sheet supply means may be installed in the optical scanner for forwarding automatically the sheet, the OMR sheet or the OCR sheet can be inserted between each of a plurality of the document sheets, so that the key word or the title corresponding to each of the plurality of the documents can be automatically inputted.

In a further preferred embodiment of the present invention, a sheet containing an OMR information zone and/or an OCR information zone, and an document image zone can be used.

After the above sheet is inputted into the memory 2 by the optical scanner 1, the controller 3 is executed to judge whether the OMR information zone and/or the OCR information zone are/is present or absent on the sheet by detecting the timing marks M of the OMR information zone or the specific code relating to the OCR information zone. The controller 3 is provided for detecting a sheet number recorded on the sheet and assigned to the sheet of the type containing the document image zone and, the OMR information zone and/or the OCR information zone. By reading the sheet number, it is detected that the sheet presently read is of the "mixture-type". The ROM 5 can store some necessary information regarding are "mixture-type" sheets. The OMR information zone and/or the OCR information zone can store the key word, the title information while the document image zone can store the image parttern. These items of information can be outputted as being related to each other.

In the present invention, the coded image may be stored into the memory 2 after the image obtained by scanning is converted to the black codes "1" or the white codes "0". The embodiment of the present invention can be used in the electronic file system.

The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention. There are described above novel features which the skilled man will appreciate give rise to advantages. These are each independent aspects of the invention to be covered by the present application, irrespective of whether they are included within the scope of the following claims.

CLAIMS:

1. A sheet information input apparatus comprising:

inputting means for inputting a sheet image into the apparatus;

judging means responsive to the input means for judging a type of specific code on the inputted sheet; and

reading means responsive to the judging means for reading information from the sheet.

2. The sheet information input apparatus of claim 1, wherein the sheet is an optical mark reader (OMR) sheet, an optical character reader (OCR) sheet, or a document sheet each containing some image or information.

3. The sheet information input apparatus of claim 1, wherein the sheet contains a mixture of an OMR information and/or an OCR information, and a document image.

4. The sheet information input apparatus of claim 1, further comprising:

sheet supply means for automatically supplying each of the sheets to the inputting means.

5. A circuit for detecting a type of sheet comprising:

inputting means for inputting a sheet image;

judging means comprising:

coding means for coding information on the sheet;

calculation means responsive to the coding means for calculating a type of coded information; and

detecting means responsive to the calculation means for detecting the type of sheet.

6. The circuit of claim 4, wherein the calculation means comprises a central processing unit, counter means, arithematic operation means, a read only memory,and a random accsees memory.

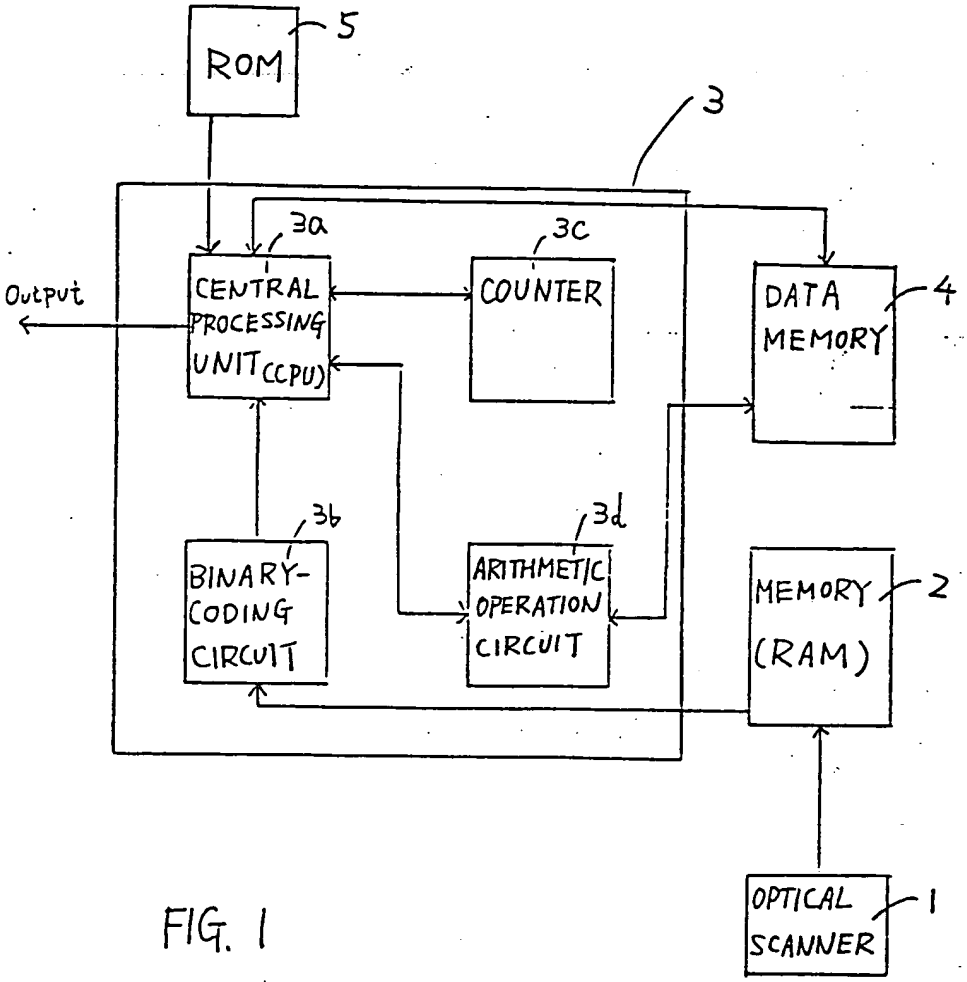
ROM
5
3
3a
3c
Output
CENTRAL PROCESSING UNIT (CPU)
COUNTER
DATA MEMORY
4
3b
3d
BINARY-CODING CIRCUIT
ARITHMETIC OPERATION CIRCUIT
MEMORY (RAM)
2
OPTICAL SCANNER
1

FIG. 1

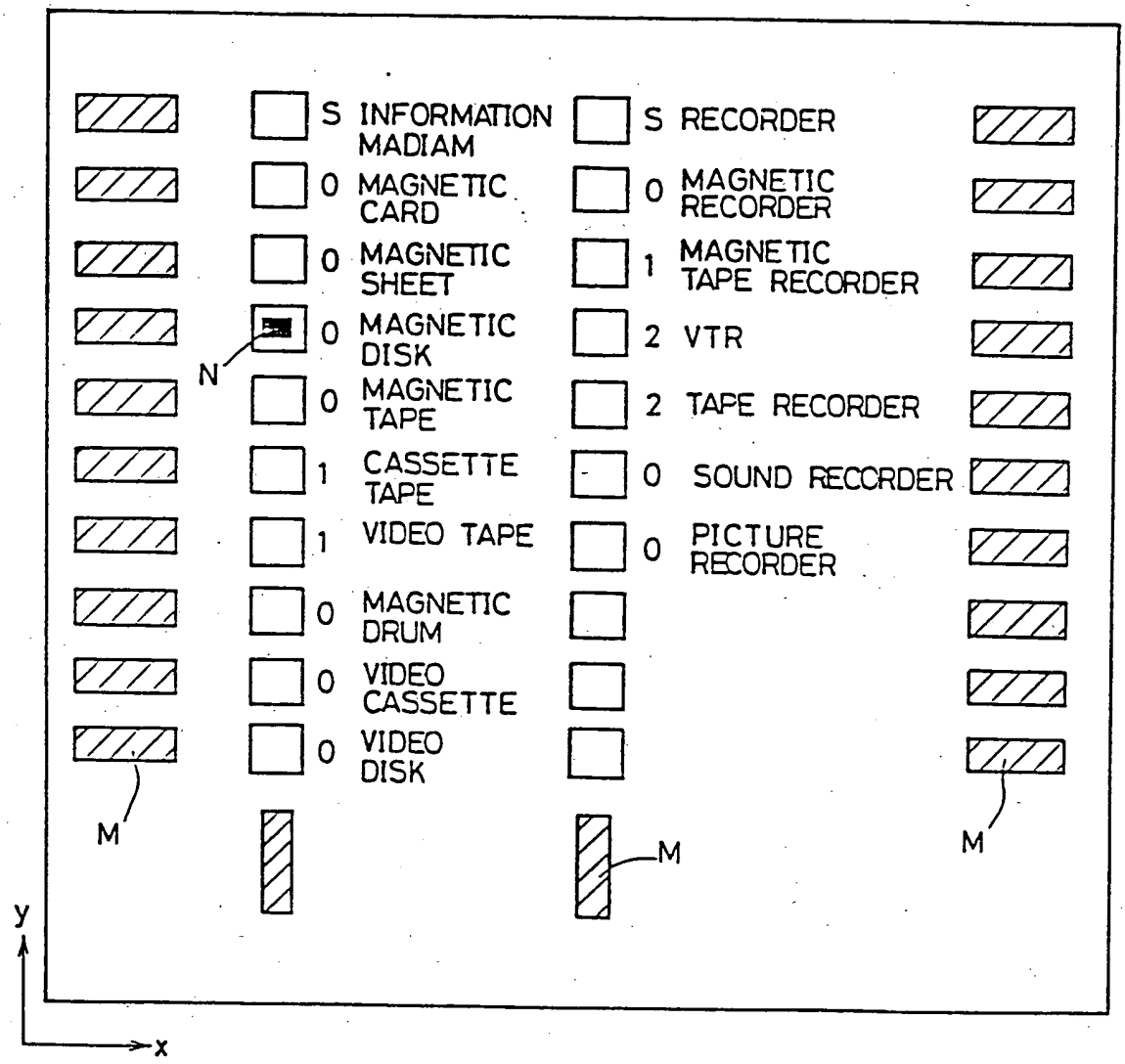
S INFORMATION MADIAM
0 MAGNETIC CARD
0 MAGNETIC SHEET
0 MAGNETIC DISK
0 MAGNETIC TAPE
1 CASSETTE TAPE
1 VIDEO TAPE
0 MAGNETIC DRUM
0 VIDEO CASSETTE
0 VIDEO DISK
N
M
S RECORDER
0 MAGNETIC RECORDER
1 MAGNETIC TAPE RECORDER
2 VTR
2 TAPE RECORDER
0 SOUND RECORDER
0 PICTURE RECORDER
M
M
y
x

FIG.2

FIG. 3

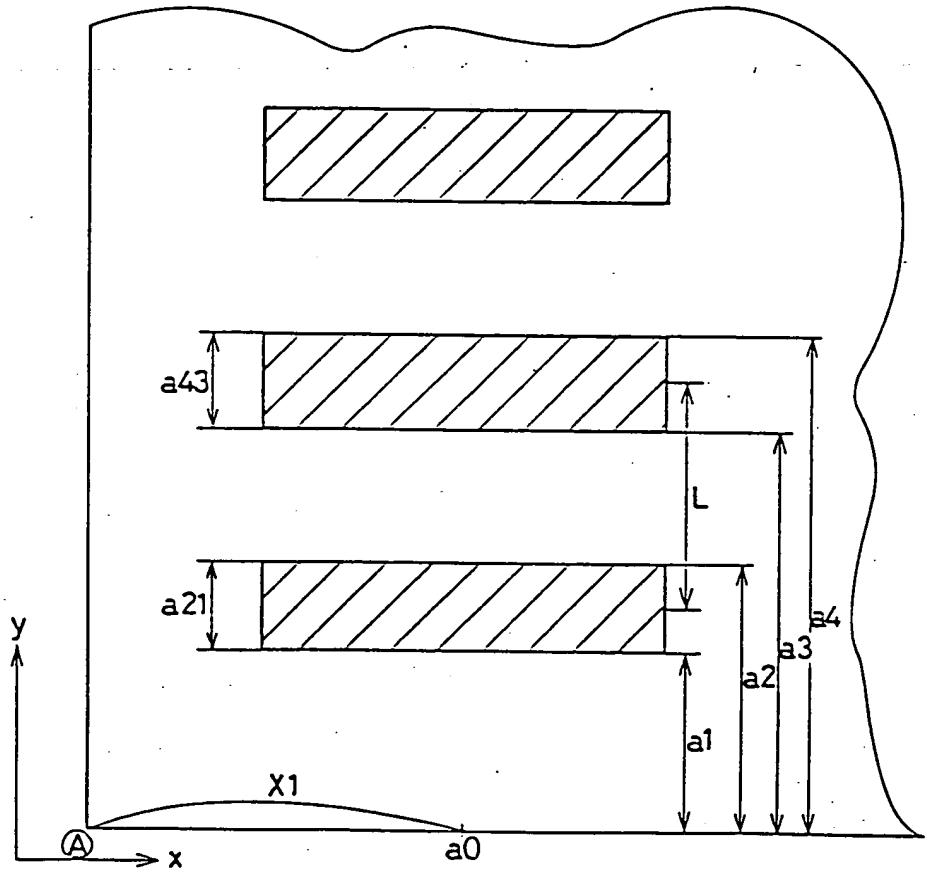

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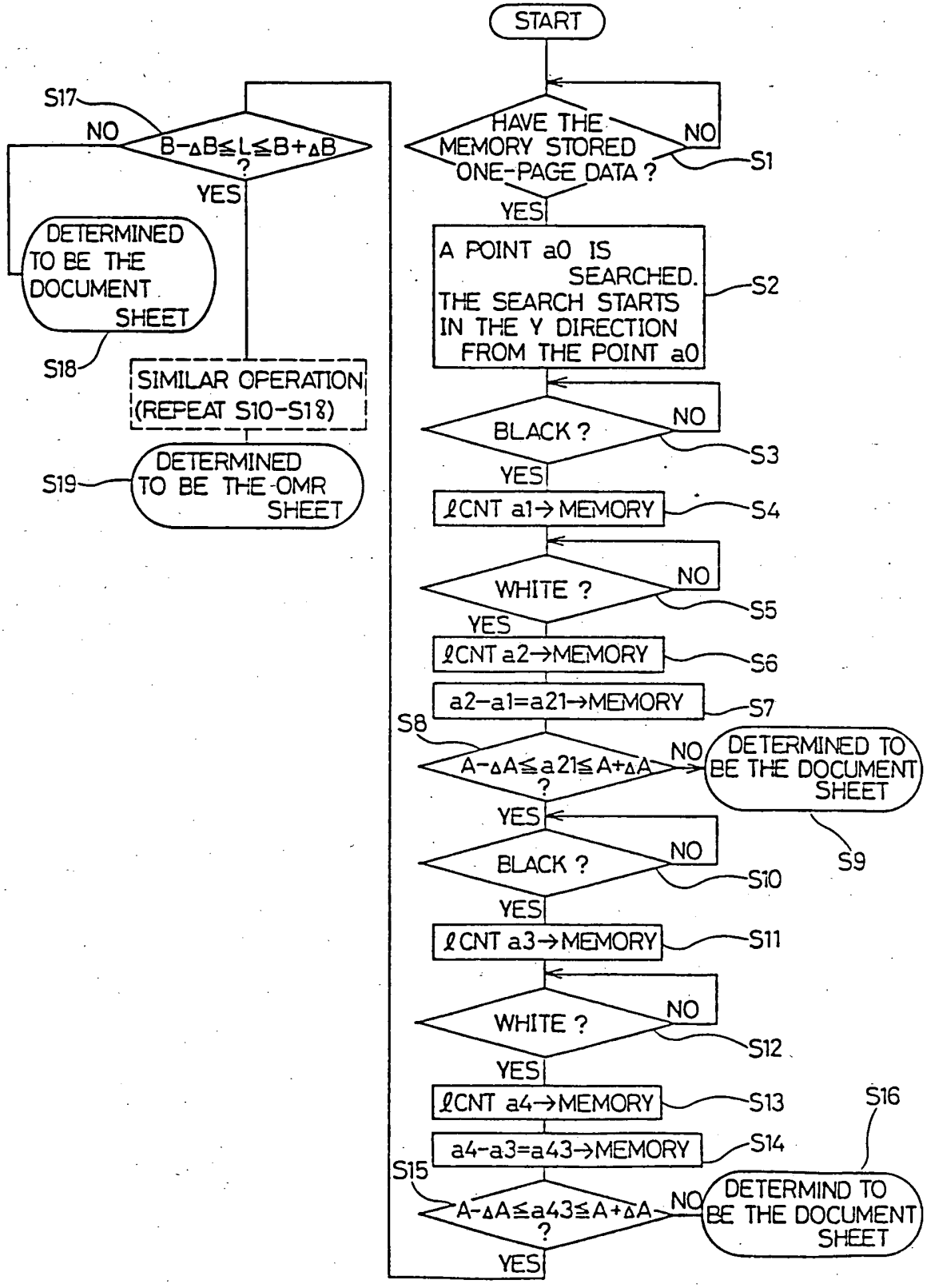
FIG. 4



European Patent Office

EUROPEAN SEARCH REPORT

0125877

Application number

EP 84 30 3123

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	PATENTS ABSTRACTS OF JAPAN, vol. 5, no. 153 (E-76)[825], 26th September 1981; & JP - A - 56 84 072 (TOKYO SHIBAURA DENKI K.K.) 09-07-1981	1,2	
Y	IDEM	3,4	
Y	JP-A-58 062 968 (TOKYO SHIBAURA DENKI K.K.) * Column 3, line 41 - column 4, line 12; column 7, lines 16-43 * & US - A - 4 566 127 (SEKIYA et al.)(Cat. L)	3	
Y	US-A-4 086 443 (GORHAM et al.) * Column 7, line 1 - column 8, line 49; column 11, lines 3-23; column 22, lines 1-60 *	4	TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
A		5,6	
A	IBM TECHNICAL DISCLOSURE BULLETIN, vol. 24, no. 9, February 1982, pages 4625,4626, IBM Corp., New York, US; J.M. NAGDA et al.: "Control sheet with row count verification" * Whole document *	6	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11-07-1986	SCHOENE, K.P.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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L : document cited for other reasons

& : member of the same patent family, corresponding document

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